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IMPROVEMENT OF THE PLASMA AND ERYTHROCYTES LIPID PROFILE IN OVERWEIGHT/OBESE AND DYSLIPIDEMIC PATIENTS AFTER CONSUMPTION OF A NATURALLY PUFA-ENRICHED CHEESE

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Background and Objectives:

Obesity is considered a key factor in a vast array of diseases. There are evidences associating the PUFA-enriched diets with a lower incidence of cardiovascular diseases (CVD). In this sense there is much interest in adding value to dairy products by naturally increasing the PUFA levels. Within the context, a PUFA-enriched low fat cheese was elaborated (Lactalis Iberia) from ruminant milks whose diet included a commercial linseed supplement (Lodyn S.L). A balanced hypocaloric diet including the consumption of this functional cheese for its potential benefits by overweight/obese and dyslipidemic patients, was analyzed.

Our aim was to assess the effect of the functional cheese intake, through the changes in the lipid composition of plasma and erythrocytes from volunteers and identify potential health biomarkers.

Methods:

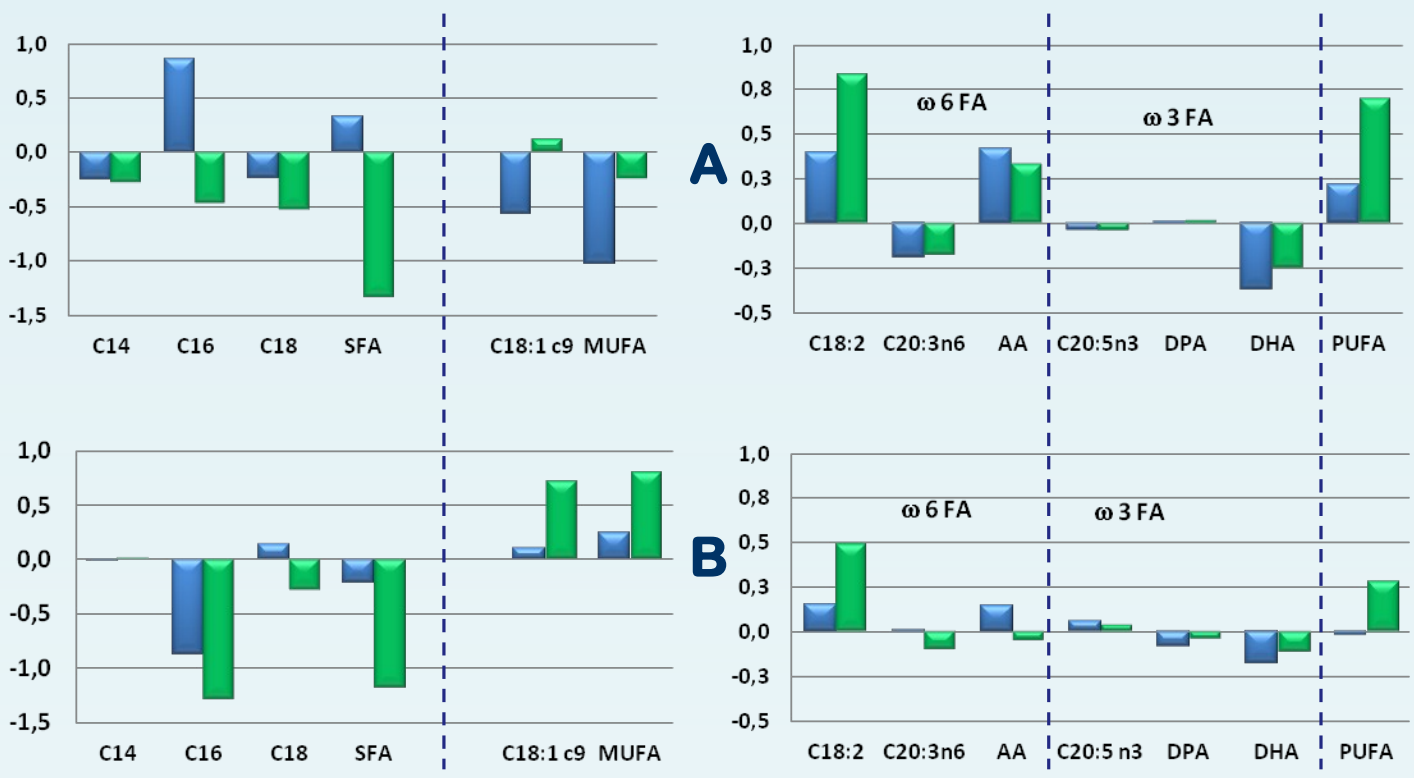
A prospective, randomized, double-blind, placebo-controlled clinical trial was performed. Sixty two overweight/obese and dyslipidemic volunteers were randomly assigned to receive during 12-wk a 60g/day intake of Light Cheese (LC) or Light Functional Cheese (LFC). Lipids from plasma and erythrocytes were derivatized by a direct transmethylation procedure and FAME profile was thoroughly monitorized by GLC-MS. A complete lipid classes analysis of the erythrocyte through HPLC-ELSD was also determined.

Results:

Table 1. Nutritional facts of the Light Cheese (LC) and Light Functional Cheese (LFC)

Nutrient	Control group (LC)		Experimental group (LFC)	
	Per 100 g	Per serving 60 g daily	Per 100 g	Per serving 60 g daily
Energy (Kcal)	286.3	171.8	319.8	191.8
Carbohydrates (g)	2.8	1.68	2.8	1.68
Protein (g)	23.1	13.8	23.6	14.2
Total fat (g)	20.3	12.8	23.8	14.2
% SFA	62.9	37.74	61	36.6
%MUFA	30.6	18.36	30.3	18.18
%PUFA	6.5	3.9	8.55	5.13
% w6	4,9	2.94	5.6	3.36
% w3	0,53	0.31	1.04	0.62
w6/w3	9.24	5.54	5.38	3.22
% CLA	0.62	0.37	0.97	0.58
% C18:1 11t	1,27	0.76	1.69	1.01

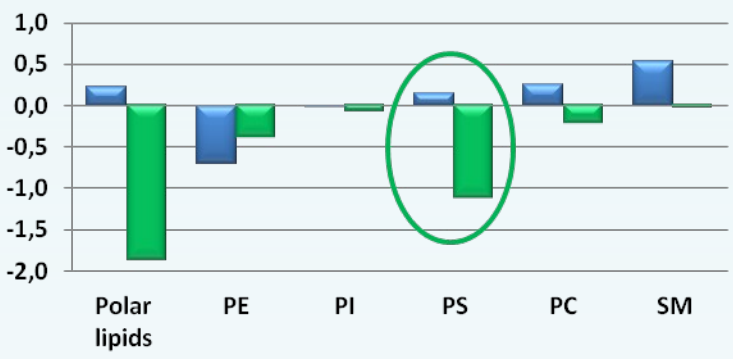
Figure 1. Changes in the FAME profile of plasma (A) and erythrocytes (B) from volunteers consuming LC or LFC diet. (GC-MS analysis).



➢ ANALYSIS OF FAME

The dietary–induced changes in the FA composition of plasma and erythrocyte were quite similar (Figure 1). In volunteers consuming LFC, the levels of saturated fatty acids (SFA) significantly decreased. Particularly interesting is the reduction in the content of palmitic (C16:0) acid, since is considered to be cholesterol-raising and is associated with the increased incidence of CVD. A noteworthy increase in the PUFA content, correlated with the higher amount of linoleic (C18:2) acid, was also detected. However, no significant differences between groups were found as regards the content of the remainder n-6 PUFA or of the n-3 PUFA. Regarding MUFA, an enhancement in oleic acid (C18:1c9) level occurred in erythrocytes but not in plasma from the LFC group.

Figure 2. Changes in the content of major polar lipids in erythrocytes from volunteers consuming LC or LFC diet. (HPLC-ELSD analysis).



PE: phosphatidylethanolamine; PI: phosphatidylinositol; PC: phosphatidylcholine; SM: sphingomyelin.

➢ ANALYSIS OF POLAR AND NEUTRAL LIPIDS

The analysis of the different lipid classes, revealed no changes in the distribution between polar (43%) and neutral (57%) lipids in erythrocytes from volunteers who consumed LC diet. However, a 2% decrease in the polar compounds content was found with LFC diet. As can be seen in Figure 2, this reduction mainly affected PS and PE, both located preferentially in the inner leaflet of the human erythrocyte membrane. This fact could be partially explained by the lower availability of C16 (Figure 1), since that FA is mainly incorporated into the *sn-1* position, during the biosynthesis of PS and PE. Among neutral lipids, cholesterol was the main component (>75%) and in LFC group its content diminished although not significantly.

Conclusions:

The LFC intake improves the FA composition of plasma and erythrocytes from overweight/obese and dyslipidemic patients.

Keywords: Obesity, lipid profile, PUFA-enriched cheese

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